The Impact of the High Technology Crisis on CEO Compensation

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Abstract: The paper empirically examines CEO compensation in 125 UK high technology firms in an attempt to identify and understand any changes in the pay system evident after the global technology market correction in 2000. We find evidence that link between executive pay and market returns weakened and that the fixed component of executive pay in these companies rose post-adjustment. These changes appear to compensate executives for the increased risk associated with variable pay rather than rectify any perceived problems with executive incentives pre-2000.

Keywords: High technology, CEO compensation, Financial crisis, Options, Corporate governance

I. INTRODUCTION

The rapid decline in the market values of high technology (high-tech) public companies at the end of the twentieth century generated enormous interest in the pay of executives in this industry. The large pay packages received by high-tech executives in the late 1990s were already the subject of much public and media attention before the technology market crash of 2000 [1] [2]. However, defenders of these payments suggested that the large rewards were commensurate with the astronomical rise in value of these companies [3] [4]. As such, we see the joining of a traditional battle in the technology industry: Is top executive pay linked with firm performance?

There is an extensive literature on management remuneration, but most of these studies lack focus on high-tech firms. Compared to other industries, the high-tech sector relies heavily on human capital and intangible assets and operates in a more uncertain and competitive environment. One of the distinguishing features of pay systems in high-tech industries is the prevalence of stock option plans [5] [6]. Liccione [7] revealed that more than 96 percent of the direct pay of the typical technology executive came through annual bonuses and stock options. A detailed analysis of the pay of executives in these firms thus contributes to our understanding of this rapidly changing industrial environment, and also facilitates the comparison of behaviours before and after the rapid revaluation of these companies in the crisis of 2000.

The global technology market was booming in the 1990s. Share prices relative to corporate earnings, especially those in the high-tech markets, had been rising steadily. Simultaneously, top management of the high-tech firms received large payments through the exercise of the stock options they held. A survey performed by the Roper Center showed that 79 percent of respondents agreed that CEOs were overpaid [8]. Investors rarely expressed such concerns: presumably because they were happy with what they were able to make through the appreciation in share values. This bull run came to an end in 2000, and there is some evidence that this changed investors' sentiment. Liccione [7] noted that there were changes in pay philosophy and practice in high-tech firms after the crash: arguing that stock options could not effectively motivate employees to work toward business goals in this environment, and citing increasing market demands for profitability from technology firms. This evidence is not entirely convincing and little other research has been carried out that tries to identify any changes in the way that the high-tech companies reward their executives post-crisis. This paper attempts to address this gap directly.

Some studies investigating the impacts of recent financial crises argue that compensation schemes which encourage excess risk taking might have helped to cause the financial crises or scandals [9]. The investigation report issued by the United States Senate [10] also asserts that excessive compensation is one of the reasons for Enron's collapse. These results suggest that developing compensation plans that align executive and shareholder interests is critical. The 2000 technology market crisis permits us to examine changes in the executive pay structure of this peculiar sector before and after the crisis, and encourages reflection on the usefulness of existing theory for understanding these changes. The purpose of this paper is to compare the pay structure and determinants before and after the market adjustment in 2000. The results of this study not only expand our knowledge of changes in CEO pay, but also provide perspective on the design of executive compensation package for companies in technology field.

II. EXECUTIVE PAY IN HIGH-TECHNOLOGY INDUSTRIES

The asymmetry of information between executives and shareholders is more pronounced in the high technology sector than in other industries due to the nature of the business [11]. Viewed from the principal-agent perspective, this asymmetry should create greater emphasis on performance-related pay to deal with the relatively high agency costs that might otherwise manifest [11]. Conversely, shorter product life cycles and acute market competition put high-tech executives in a more dynamic and riskier working environment [12]. Risk-averse

managers will find it difficult to diversify this risk, and this could make performance-related pay more costly in high-tech companies [5] [11].

The net effect of these two phenomena are an empirical question, and existing work suggests that high-tech companies should offer higher basic pay and make more use of bonus and long-term incentives to attract and retain talent [13]. In fact, executives in high-tech firms have a relatively high proportion of incentive compensation which is more often linked to stock prices [5] [13]. Some fluctuations in stock prices are, of course, determined by forces beyond the control of the managers [14], and as such market performance will not completely reflect managerial effort. In the late 1990s, while many high-tech companies were still unprofitable, stock prices were increasing rapidly because of irrational market expectation and speculation [15]. The resulting bubble eventually collapsed in April 2000.

Liccione [7] reports an examination of US proxy data from high-tech companies in 1998 and 1999, revealing a weaker emphasis on cash compensation and a stronger emphasis on stock options in high-tech firms in 1999 relative to executives in other industries (Exhibit 2, p. 22). He also suggests that the components of direct pay in technology companies became more like those in traditional firms after the bubble burst, with typical salaries for executives in high-tech firms rising at roughly twice the pace of those in other firms, while bonuses and option grants grew more slowly (Exhibit 1, p. 22). These results provide a useful benchmark against which to consider the analyses in this paper.

III. The Compensation Determinants

A. Firm Performance

Agency theory argues that conflicts of interest dominate in the presence of asymmetric information unless an effective disciplinary and incentive system is in place. Previous literature has suggested the adoption of a pay for performance mechanism linking CEO pay to shareholder wealth [16]. Conventional proxies for performance are market performance and economic performance. Evidence of the link between executive pay and market and/or economic performance is mixed. Some studies show a positive link between pay and firm performance, others report no link, and some even report a negative association [16] [17].

Given previous evidence suggesting that high-tech executives receive a large proportion of their pay through options and other share-based mechanisms [1] [7] [14]. we expect that CEO remuneration in high-tech firms to be closely linked to market performance. The corollary of this point is that the link with economic performance may be quite weak, particularly given that many high-tech companies struggle to generate accounting profits. Indeed, for companies in network industries who are pursuing corporate strategies that are the modern equivalent of a 'land grab', any meaningful economic profits in the short term could be seen as a failure to deliver on long run profitability. Hence, we anticipate that the link between pay and accounting performance might be weak.

Liccione [7] noted that after the crash, equity markets began to demand evidence of profitability from high-tech companies in order to justify high stock prices. This refocusing of investor objectives might also drive companies to increase the links between executive pay and profitability, though the profitability of these companies is still weak after the crisis. This change in labour demand might be matched by a change in preferences on the supply side. Falling stock prices greatly reduced the wealth and option incomes of executives, as well as exposing them to greater uncertainty about future earnings. These factors might make forms of compensation that are not linked to equity prices more appealing to executives [29].

B. Corporate Governance

Corporate governance structures are thought to help align executive incentives with those of shareholders, improve meritocracy in boardrooms, reduce the risk of fraud, and safeguard the wealth of stakeholders [18]. Recommendations for the existence and composition of these corporate governance structures have garnered substantial attention from regulators and academics (The Combined Code, 1998; The New Combined Code, 2003 and [19]). Some governance recommendations are designed to restrain executive excesses. For example, the advocacy of increased non-executive board membership, the separation of roles between chairmen and CEOs, and the delegation of functions and power to sub-committees all represent attempts to limit the ability of CEOs to pursue private agendas rather than shareholder wealth.

Corporate governance codes in the UK limit the ability of CEOs to set their own pay. That said, a smaller proportion of high-tech firms followed these corporate governance guidelines in the 1990s relative to other industries [20]. Beasley et al. [21] examined the governance structures of companies in the technology, health care and financial services industries. They compared the structures present in companies exhibiting fraud in financial statements with a control group, and they found that corporate governance mechanisms are usually weak in the sample of 'fraudulent' companies.

The collapse of share prices in technology markets, coupled with scandals related to Enron and WorldCom, has reminded companies and investors of the importance of good corporate governance. As such, we anticipate an enhanced role for corporate governance structures in regulating the pay of CEOs in high-tech companies.

C. Capital Structure

Share ownership is one focus in contemporary compensation and performance studies. Denis et al. [22] pointed out that ownership structure has an important influence on internal monitoring efforts. The most commonly studied ownership groups are managerial shareholdings and institutional shareholdings. Many previous studies report that increases in director and blockholder shareholdings strengthen their monitoring role and facilitate increases in executive pay [23] [24]. Some studies also consider CEO shareholding. Notably, Core et al., [23] and Cheng and Firth [24] all report a negative relation between executive pay and shareholding.

Explanations for this phenomenon include: (1) the dividend income is sufficient reward for executives; (2) top management may deflect criticism for high salaries, bonuses, etc.; (3) restraints in executive pay facilitate similar restraints on pay for lower level employees [24].

During the late 1990s the share prices of high-tech companies climbed and investors ignored criticisms of the pay levels: presumably because they could realize abundant returns in the marketplace [15]. The change in the market eliminated these paper gains, and with it the indulgent sentiment of the shareholders. Shareholders scrutinized company performance more closely, and paid greater attention to the activities of top management. As such, we hypothesize that changes in the attitudes of the shareholders and directors after the market adjustment should increase monitoring activity, and thus increase their restraint of executive pay after the crash.

Cheng and Firth [24] confirm that executive owners in quoted companies are likely to receive lower emolument than executive employees. Elson [25] notes that high-tech executives hold a greater percentage of their companies' shares and argues that directors with substantial shareholdings would be much more appropriate custodians of companies after the adjustment. As such, we expect that high-tech executives, like their counterparts in other industries, would be more willing to accept lower compensation after the crash.

IV. Research Methodology

A. Data and Source

The data comes from a census of the high-tech companies listed on London Stock Exchange from 1998 to 2002. Only companies whose major activities are based in the UK are included in the sample. In order to generate useful measures of market return and change after the market adjustment, companies with data less for than three years are excluded from the resulting sample. All nominal values are converted to real values using the retail price index.

The sample of high-tech firms includes companies that engage in computer hardware, semiconductors, telecommunication equipment, software, computer services and Internet business, and which are quoted on techMARK. The final number of companies in this sample is 125 and the total number of observations is 553 consisting of 85 cases in 1998, 98 in 1999, 125 in 2000, 125 in 2001 and 120 in 2002.

The study covers five years beginning in April 1998. The first two of these years come before the high-tech market correction in April 2000, and the last two come after the adjustment. Comparison of these two sets of two years enables us to examine variations before and after the market adjustment.

Information about chief executive officers and corporate governance institutions are obtained from the annual reports. Financial information is taken from the DATASTREAM and FAME databases.

B. Research Method

We use panel data analysis to model the relation between CEO pay and its determinants. We first split the dataset in to two sub-panels: 1998-1999 and 2001-2002. This allows isolation of the periods before and after the rapid adjustment of share prices in technology markets. We then compare the regression coefficients for these two periods. The basic form of our model is:

$$CEOPAY_{i,t} = \beta_0 + \beta_1 MKTRTN_{i,t} + \beta_2 ROE_{i,t} + \beta_3 \%NONEXE_{i,t} + \beta_4 SEPROLE_{i,t} + \beta_5 REMCOM_{i,t} + \beta_6 \%DIRSHR_{i,t} + \beta_7 \%Blk_{i,t} + \beta_8 \%CEOSHR_{i,t} + \beta_9 CONTROL_{i,t} + \varepsilon_{i,t}$$

where,

CEOPAY is further divided into the following measures:

- Ln_SALBON: Logarithm of SALARY and bonus
- Ln_TTLPAY: Logarithm of SALBON and realized gains from exercising options and long-term incentives
- Ln_PAYOPTDIFF: Logarithm of TTLPAY and increase in the value of options held at the end of the fiscal year

MKTRTN: Market return per outstanding share

ROE: Return on shareholders' equity

%NONEXE: Percentage of nonexecutive directors on the board of directors

SEPROLE: Dummy variable, 1 if the incident exists, 0 otherwise

RECOM: Existing of a remuneration committee. Dummy variable, 1 if the incident exists, 0 otherwise

%DIRSHR: Proportion of shares owned by the directors to the total issued shares

%BLK: Proportion of shares owned by the substantial outside shareholders to the total issued shares

%CEOSHR: Proportion of beneficial shares owned by the CEO to the total issued shares

CONTROL: Control variables are used to control the effects of firm size, industry and CEO traits on the CEO compensation

The dependent variables are different measures of high-tech CEO compenstion. The independent variables comprise the measures of corporate performance, corporate governance, ownership structure and control variables.

V. Results

The following tables report the econometric results of the changes of the relations between CEO pay and determinants after the high-tech adjustment in 2000. The first two columns of each table show the regression coefficients and t-statistics associated with the pre-adjustment and post-adjustment periods. The third column reports a t-statistic for the null hypothesis that the two coefficients in the first column are equal.

Table 1 presents the regression results for the logarithm of salary-plus-bonus (Ln_SALBON). As can be seen, remuneration committees (REMCOM) and CEO shareholdings (%CEOSHR) are positively related to pay. Market returns (MKTRTN) are positively linked to pay in this period, while there is no such link between accounting returns (ROE) and pay. This suggests that boards had market returns rather than accounting profits in mind when setting executive bonuses during this period. Directors' ownership is negatively associated with CEO salary-plus-bonus levels.

Post-adjustment the proxies for ownership structure (%DIRSHR, %BLK and %CEOSHR) exhibit inverse relations with salary-plus-bonus. They also show that the positive

relation between the existence of a remuneration committee and executive pay breaks down. These results provide evidence that monitoring is strengthened after 2000. Again, these changes in the significance pattern are suggestive, but the t-tests for the difference in coefficients are equivocal. We see clear evidence only of differences in the constants and in the coefficients associated with the existence of remuneration committees and the shareholdings of CEOs.

Table 1

Variables	Ln_SALBON		DIFFERENCE BETWEEN PERIODS
	98 & 99	01 & 02	T - Test
Constant	6.728 (14.496)***	8.340 (19.553)***	2.4968**
MKTRTN	0.030 (2.613)***	0.015 (0.304)	0.2366
ROE	-0.003 (-1.086)	-0.027 (-1.256)	0.8914
%NONEXE	-0.180 (-0.776)	0.389 (1.771)*	1.7287*
SEPROLE	0.055 (0.692)	-0.115 (-1.238)	1.2964
REMCOM	0.396 (3.760)***	-0.071 (-0.505)	2.4143**
%DIRSHR	-0.455 (-2.038)**	-0.453 (-2.461)**	0.0077
%BLK	-0.103 (-0.450)	-0.572 (-3.995)***	1.8308*
%CEOSHR	0.890 (3.075)***	-0.668 (-2.407)**	3.7615***
CONTROL	Yes	Yes	
N	145	218	
Adjusted R^2	0.630	0.586	

* significant at the 0.10 level;
** significant at the 0.05 level;
***statistically significant at the 0.01 level.
Results corrected for heteroskedasticity

Table 2 displays the results for the logarithm of salary, bonus and realized gains from LTIPS (Ln_TTLPAY). The findings for the pre-adjustment period reveal that market returns (MKTRTN) are positively related to total pay, while there is no relation with accounting return (ROE). The coefficients associated with the proportion of non-executive directors on the board (%NONEXE) are not significantly different from zero, but again we see that the existence of a remuneration committee (REMCOM) is associated with higher levels of pay. The ownership structure coefficients are insignificant in the pre-adjustment period, though CEO's equity holding displays a weak positive relation (%CEOSHR). Post-adjustment, the results show a complete collapse in the relation between pay and performance. As with the results in Table 1, we see that the relation between remuneration committees and pay evaporates, and we see a growing importance of ownership structure: block ownership and CEO shareholdings now appear to restrain executive pay. The differences in coefficients for remuneration committees, CEO shareholdings and the constants are significant at conventional levels.

Finally, Table 3 illustrates the findings for the logarithm of salary, bonus, gains from LTIPs and the growth in the value of options held by CEOs (Ln_PAYOPTDIFF). In the pre-adjustment period market performance (MKTRTN) has a strong and positive relation with the level of the pay package. Little else appears to matter, though the establishment of a remuneration committee (REMCOM) shows a positive coefficient on the fringes of significance (t=1.928). The relation between pay and performance has eroded post-adjustment, and we see the increased importance of blockholder and CEO share ownership. The test of the difference of these coefficients between periods is insignificant.

Table 2

Variables	Ln_TTLPAY		DIFFERENCE BETWEEN PERIODS
	98 & 99	01 & 02	T - Test
Constant	5.500 (7.122)***	8.086 (16.576)***	-2.9775***
MKTRTN	0.059 (1.985)**	-0.039 (-0.688)	1.3451
ROE	-0.0002 (-0.037)	-0.015 (-0.827)	0.6574
%NONEXE	-0.769 (-1.844)*	0.156 (0.532)	-1.8700*
SEPROLE	0.226 (1.660)*	-0.107 (-0.855)	1.7974*
REMCOM	0.577 (3.434)***	-0.093 (-0.492)	2.4831**
%DIRSHR	-0.253 (-0.635)	-0.437 (-1.783)*	0.4151
%BLK	-0.246 (-0.898)	-0.633 (-3.256)***	1.1825
%CEOSHR	0.698 (1.955)*	-1.121 (-3.090)***	3.4214***
CONTROL	Yes	Yes	
N	145	218	
Adjusted R^2	0.453	0.483	

* significant at the 0.10 level;
** significant at the 0.05 level;
***statistically significant at the 0.01 level.
Results corrected for heteroskedasticity

Table 3

Variables	Ln_PAYOPTDIFF		DIFFERENCE BETWEEN PERIODS
	98 & 99	01 & 02	T - Test
Constant	4.695 (3.416)***	7.366 (12.066)***	1.9827**
MKTRTN	0.298 (7.002)***	0.169 (1.643)	0.9812
ROE	-0.024 (-1.173)	0.007 (0.342)	-1.0352
%NONEXE	-0.201 (-0.313)	0.276 (0.605)	-0.6224
SEPROLE	0.061 (0.292)	-0.083 (-0.621)	0.6084
REMCOM	0.786 (1.928)*	0.013 (0.041)	1.5040
%DIRSHR	0.330 (0.490)	-0.056 (-0129)	0.5047
%BLK	-0.086 (-0.172)	-0.502 (-2.111)**	0.8290
%CEOSHR	-0.017 (-0.025)	-1.008 (-2.281)**	1.2845
CONTROL	Yes	Yes	
N	145	218	
Adjusted R^2	0.511	0.427	

* significant at the 0.10 level;
** significant at the 0.05 level;
***statistically significant at the 0.01 level.
Results corrected for heteroskedasticity

VI. Discussion

Previous studies [5] [13] suggest that the prominent feature of executive rewards in high-tech industries is the extensive use of options. This study confirms this diagnosis.

The change of the effect of remuneration committee on CEO pay in the post-adjustment period indicates changes of pay philosophy and practice in high-tech firms. Main and Johnston [26] argue that the purpose of a remuneration committee is neither to hold down nor boost up the pay level. A remuneration committee is expected to tie the shareholders' interest to performance. The positive link between the CEO pay and the existence of a remuneration committee before the market adjustment reflects the focus of the management board and shareholders on market performance. They are willing to accept a high pay level if the firm's share price is favourable. After the adjustment, the shareholders suffer a severe loss on the stock market. The evaporation of the positive relation between the remuneration committee and CEO pay illustrates a change in the shareholders' philosophy and sentiment: their interests are tied to an extent beyond stock performance.

The decline in performance-based pay also creates a need for increased monitoring by shareholders, as the links between pay and performance are essentially non-existent in the post-adjustment period, and this might be thought to decrease the alignment between the financial interests of executives and shareholders. Consistent with this expectation, our results point to an increased impact of outside shareholders on executive pay after 2000, and suggest reclamation of remuneration committees from executive control.

CEO share ownership declines significantly after the adjustment. Before the market adjustment, CEOs with large ownership shares of their companies received more compensation than those with fewer shares, but this situation reversed after the market adjustment. The change is consistent with managerial power theory whereby CEO power leads to rent seeking and weaker governance structures [27]. Speculation drove the tech market boom of the 1990s. Sentiment of investors/shareholders in high-tech firms, was driven by rapidly rising share prices. Comparatively, little attention was given to corporate governance and executive pay. CEOs, especially those who held more shares of the companies, became powerful in determining their own pay and benefits. The significant positive relation between CEO pay and shareholding in the pre-adjustment period illustrates this argument.

Cheng and Firth [24] argued that CEOs with high shareholdings may be willing to accept lower pay: perhaps because dividend income may be sufficient to cover CEOs' needs; perhaps because a lower level of executive remuneration might suppress wage demands from other employees; and perhaps because it may deflect public criticism of excessive pay to top management. In the post-adjustment period, the sharp decline in high-tech share prices shocked the public. Disgruntled shareholders and media refocused on economic performance and criticized excess management compensation in the high tech firms. The results show that while blockholders and boards strengthened their monitoring roles, CEO owners were willing to reduce their pay to deflect media criticism and share the pain with other investors after the high tech market adjustment.

VII. Conclusions

UK high-tech firms grew dramatically in the late 1990s [28]. The growth was so rapid that a special market was launched on the London Stock Exchange in 1999. While there is an extensive research on the topics of executive remuneration, only a limited number of studies have examined technology industries [5] [11 [14], and most of these studies examine data from the US. Previous studies have revealed that the pay structure and practice in high-tech firms is different from the structure and practice in other companies, but little is known about top management pay in the UK high-tech sector. The collapse of the technology market in 2000 is a good opportunity for us to acquire some valuable information on the changes to executive pay in this sector. The objectives of this study are to understand the remuneration of top executives in UK high-tech companies, and to investigate any changes that may have occurred after the stock market adjustment in 2000.

The burst of the bubble in technology stocks created many repercussions in financial markets that have affected pension plans, personal wealth, etc. However, despite the changes to corporate performance in the technology sector, as well as the changes in the governance arrangements and ownership structures in these companies after the market adjustment, it appears that CEO pay has become less responsive to performance than before, and that this has been offset by increases in fixed components of pay.

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